

Course Information

Fall 2025 **NUCL 325, Nuclear Materials Laboratory**

Prerequisite or Co-requisite: NUCL 320

Course Description

The development of nuclear system is highly dependent on materials whose properties are controlled to accommodate a wide range of applications. The course is a laboratory course designed in parallel to NUCL 320 to reinforce the learnings by hands-on practice. The purpose of this lab is to introduce the methods and equipment to *prepare samples for metallographic analysis, test the mechanical, and thermophysical properties of materials*. To prepare for specific labs, students will be provided with lectures tailored to the experiments. For the lab sections, students will be responsible for taking experiments, recording procedures and data, analyzing data, and building formal lab reports. On average, every week students spend 1 hour on lecture, 1 hour on experiments and 1-2 hour on writing lab reports. You will succeed if you are actively engaged with the class schedule and take advantage of opportunities to communicate with the professor and teaching assistant.

Learning Resources

Course Handouts:

Teaching materials are shared with students via Brightspace. You are responsible for attending classes and taking effective notes.

Other Resource Needs:

A USB flash drive/memory stick to copy files.

A lab notebook to record procedures and data.

A computer with MS word to write the lab report.

Use your phone to take photos.

Learning Outcomes

At the end of the course, you will be able to

- understand the conceptual tools dealing with materials phenomena;
- deepen the understanding of process, microstructure, property relationship;
- record procedures and data, analyze and interpret data, use engineering judgement to draw conclusions, and write a formal lab report;
- acquire hands-on experience on sample preparation and measurement methods
- team work and leadership

Course Materials Policy

All the teaching and assignment materials in this course are intended only for authenticated users who are enrolled. Release of any these materials without obtaining written consent from the professor will be regarded as a violation of academic integrity. Recording, photographing, and releasing of the materials to the public domain without professor's written consent are prohibited and will be regarded as a violation of academic integrity.

Assignments

Assignments	Percentage Weight
Online safety training	5%
3 Quizzes	15%
Lab reports	72%
Attendance	8%
<i>Total</i>	<i>100%</i>

- Professor and TAs will respond to your request by email. Many questions can be resolved by TAs. Please talk to TAs first for general questions.
- Quiz will be given during recitation time (Wednesday morning).
- Quiz is 30 minutes in length and taken individually.
- Any disputes regarding grades must be submitted in writing to the professor and TAs within one week of the return of the assignment. Disputes submitted after one week will not be considered.
- Late reports will be graded as zero unless an extension has been pre-approved.
- Any assignments that include plagiarized materials will receive a grade of zero.
- Only the professor can excuse a student from a course requirement or responsibility. The teaching assistant cannot.

Grading Scale

Percent Grade	Letter Grade
97 – 100	A+
93 – 96.99	A
90 – 92.99	A-
87 – 89.99	B+
83 – 86.99	B
80 – 82.99	B-
77 – 79.99	C+
73 – 76.99	C
70 – 72.99	C-
67 – 69.99	D+
63 – 66.99	D
60 – 62.99	D-
< 60	F

Note: Grade may be curved if the median of the class is too low. We are targeting a median above 80.

General Rules

1. All course notifications, including corrections and schedule changes, will be posted as announcement in Brightspace and not sent via email. It is the student's responsibility to regularly check for updates and notifications in Brightspace.
2. Students who are absent from or arrive late to lectures are responsible for all materials covered during the lectures, as well as any missed assignments.
3. Students who are absent from or arrive late to labs without a reasonable excuse are not eligible to make up the missed lab.
4. If a student has an unexcused absence from a quiz, they will not be eligible to make up the missed quiz.
5. If a student misses a class or quiz and fails to provide documentation to excuse the absence before the start of the class or exam, the absence will be considered unexcused.

Emergency Preparation

In the event of a major campus emergency, the course requirements, deadlines, and grading percentages may be subject to changes that are necessitated by a revised semester calendar or other circumstances beyond the professor's control. Any relevant changes to this course will be posted on Brightspace. It is your responsibility to regularly check Brightspace for updates on any changes made to the course. Please note that email notifications will not be sent for these updates.

Course Schedule

Week	Lecture	Lab	Lab Description	Quiz
1 (8/25)	Safety, Lab Intro, DSC	1	DSC	
2 (9/1)	Labor Day No Lecture			
3 (9/8)	Steel microstructure	2	Cutting, mounting, polishing	
4 (9/15)	Steel microstructure	2	Etching and imaging	
5 (9/22)	Tensile test	3	Tensile Test	1
6 (9/29)	Tensile test	3	Tensile data analysis and fractography	
7 (10/6)	Cu Rolling/hardness	4	Work hardening	
8 (10/13)	Fall Break (makeup labs are provided in this week based on the students' needs)			
9 (10/20)	Cu Annealing/hardness	4	Recovery and grain growth	
10 (10/27)	Cu Microstructure	4	Polishing and Imaging	
11 (11/3)	Phase diagram and casting	5	Lead-Tin Binary Phase Diagram Study	2
12 (11/10)	Phase diagram and casting	5	Polishing and Imaging	
13 (11/17)	Steel heat treatment	6	Phase transformation of Steel	
14 (11/24)	Thanksgiving Day No Class (makeup labs is provided in this week based on the students' needs)			
15 (12/1)	Steel heat treatment	6	Polishing and Imaging	
16 (12/8)	Lab Makeup, Quiz, No Class			3
17 (12/15)	Final Week (No class)			

Note 1: Schedule subject to change.

Note 2: Recitation classes are used by students for working together to solve problems as study groups and reviewing the teaching materials. The professor will NOT show up in the recitation classes. For problems that could not be solved in the recitation classes, students may find the professor in his/her office hour.

Note 3: Recitation classes will be used for three quizzes.

Lab Report

- Each lab report is due on the week after the completion of the lab.
- Report should be submitted in PDF format by group leader in Brightspace. One report submission is required per group.
- The grade of each report will be returned at least 48 hours before the next report due.
- Late submission penalty is 10% per day until 100%.
- Each lab report weighs differently.

Lab 1: 6 points

Lab 2: 12 points

Lab 3: 12 points

Lab 4: 18 points

Lab 5: 12 points

Lab 6: 12 points

First lab report will not be graded. You will get 6 points as long as you submit your first report. You will get comments for your writing, data analysis and structure, which intends to help you understand the requirement.